

**What is claimed is:**

1. An apparatus for a hybrid power generation system for a marine vessel comprising:
  - a fuel cell for powering said marine vessel when a low speed is required by said marine vessel; and
  - a wave rotor for powering said marine vessel in combination with said fuel cell when a high speed is required by said marine vessel.
2. The apparatus for a hybrid power generation system of claim 1, wherein oxygen is injected from an oxygen supply into said wave rotor, and hydrogen is injected from a hydrogen supply into said wave rotor, to initiate a combustion reaction between said oxygen and said hydrogen when said high speed is required by said marine vessel.
3. The apparatus for a hybrid power generation system of claim 2, wherein high temperature high pressure steam and high temperature low pressure steam are formed by said combustion reaction.
4. The apparatus for a hybrid power generation system of claim 3, wherein said high temperature high pressure steam is ducted from said wave rotor to a turbine and expanded to rotate a shaft of said turbine.
5. The apparatus for a hybrid power generation system of claim 4, wherein a generator uses said rotating turbine shaft to generate electricity for a motor drive, wherein said motor drive drives a propulsion system for said marine vessel.

6. The apparatus for a hybrid power generation system of claim 4, wherein a gear and clutch system uses said rotating turbine shaft to turn gear sets of said gear and clutch system to drive a propulsion system for said marine vessel.
- 5 7. The apparatus for a hybrid power generation system of claim 1, wherein said fuel cell is used for driving a propulsion system of said marine vessel when said low speed is required by said marine vessel.
8. The apparatus for a hybrid power generation system of claim 1, wherein said fuel cell and said wave rotor are simultaneously used for driving a propulsion system of said marine vessel when a high speed is required by said marine vessel.  
10
9. The apparatus for a hybrid power generation system of claim 3, wherein said high temperature low pressure steam is condensed by a condenser into water to be used by said fuel cell.
10. The apparatus for a hybrid power generation system of claim 2, wherein said fuel cell uses hydrogen from said hydrogen supply and oxygen from said oxygen supply to produce electricity to power a motor drive of said marine vessel.  
15
11. The apparatus for a hybrid power generation system of claim 9, wherein said fuel cell is a regenerative fuel cell that uses electricity supplied by an outside power supply to reduce the water into hydrogen and oxygen.  
20

12. The apparatus for a hybrid power generation system of claim 11, wherein said hydrogen is stored in said hydrogen supply and said oxygen is stored in said oxygen supply.
13. The apparatus for a hybrid power generation system of claim 1, wherein said  
5 marine vessel is an underwater vessel.
14. The apparatus for a hybrid power generation system of claim 13, wherein said underwater vessel is manned.
15. The apparatus for a hybrid power generation system of claim 13, wherein said underwater vessel is unmanned.
- 10 16. A hybrid power generation method for a marine vessel, the method comprising:  
powering a motor of said marine vessel by a fuel cell when a low speed is required by said marine vessel; and  
powering a motor of said marine vessel by a wave rotor in combination  
15 with said fuel cell when a high speed is required by said marine vessel.
17. The hybrid power generation method of claim 16, wherein the step of powering said motor of said marine vessel when a high speed is required further comprises:  
injecting oxygen into said wave rotor; and  
20 injecting hydrogen into said wave rotor, thereby initiating a combustion reaction between said oxygen and said hydrogen.

18. A hybrid propulsion system for a marine vessel comprising:

a fuel cell for powering said marine vessel when a low speed is required by said marine vessel; and

5 a wave rotor for powering said marine vessel in combination with said fuel cell when a high speed is required by said marine vessel.

19. The hybrid propulsion system of claim 18, wherein oxygen is injected from an oxygen supply into said wave rotor, and hydrogen is injected from a hydrogen supply into said wave rotor, to initiate a combustion reaction between said oxygen and said hydrogen when said high speed is required by said marine vessel.

10

20. The hybrid propulsion system of claim 19, wherein high temperature high pressure steam and high temperature low pressure steam are formed by said combustion reaction.